What impacts more on innovation : Organizational context or individual competences ?

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Abstract
The present article examines the link between a firm's organizational context and its capacity to be ambidextrous in terms of innovation. Although the management practices underlying context have a profound effect on innovation, their impact has not previously been investigated. Nor has research looked empirically at the individual competences that should be developed in order to favour specific types of innovation. Using a dataset of 174 firms, the present study shows that firms pursuing exploration and exploitation strategies in terms of innovation should adopt long-term oriented practices that favor risk taking and creativity, thus creating an appropriate organizational context. Competence management was found to have a strong moderating effect on the link between organizational context and innovation ambidexterity. Implications include the need to look at how management may increase innovation ambidexterity, and to chose appropriate combinations of competences and organizational context.

Introduction

In the recent literature on innovation, there seems to be a consensus that firms should develop the capacity to explore new technological paths, while continuing to exploit their existing competences (e.g., Levinthal and March 1993, March 1991, O'Reilly and Tushman 2004, Tushman and O'Reilly 1996). An appropriate balance between these two activities is seen as necessary for a firm to be both competitive in mature markets - where costs, efficiency and incremental innovations are critical - and, at the same time, to be innovative in terms of product development for emerging markets - where experimentation and flexibility are needed (Tushman and O'Reilly 1996). The capacity to simultaneously pursue these two contradictory objectives (Smith and Tushman 2005) is called ambidexterity. Although there is a growing literature on ambidexterity, few empirical studies have been carried out into the antecedents of innovation ambidexterity and, more specifically, into management's role in fostering this ambidexterity. Previous research has resulted in a number of conflicting perspectives on how to simultaneously separate and integrate exploration and exploitation activities; however, the literature does not address the fact that, in order to achieve innovation ambidexterity (He and Wong 2004), firms must combine contradictory management practices (Ghoshal and Bartlett 1994, Gibson and Birkinshaw 2004). Our research tries to fill this gap by examining that organizational context that deals with the integration of both exploration and exploitation activities. The present paper examines how the way management deals with a firm's short- and long-term orientations affects innovation ambidexterity. We also tested the moderating effect of competence management, as learning and creating competences are essential for innovation strategies.

2. Theory and Hypotheses

2.1. Exploitation, exploration, and innovation

Finding the right balance between exploration and exploitation is complicated but essential for survival (March 1991). In the management and organization literature, ambidexterity is defined as the synchronous pursuit of both exploration and exploitation (Gupta et al. 2006); we apply the concept of ambidexterity to the context of innovation. Research into double learning constraints in the field of innovation (He and Wong 2004, Jansen et al. 2005, O'Reilly and Tushman 2004) has advocated the superiority of the ambidextrous form. Innovation ambidexterity implies that firms simultaneously combine exploitation and exploration strategies to achieve superior innovation – a prerequisite for sustained performance (He and Wong 2004) –and that exploration and exploitation innovations are orthogonal and complementary (Gupta et al. 2006).

He and Wong (2004) define exploration innovation in terms of activities aimed at entering new product-market domains whereas exploitation innovation denotes activities aimed at improving existing product-market

positions. Recent research into innovation (Benner and Tushman 2003, Danneels 2002, Gilsing and Nooteboom 2006, O'Reilly and Tushman, 2004, Smith and Tushman 2005) has used the exploration/exploitation construct because it encompasses aspects linked to competences (Gilsing and Nooteboom 2006). Exploration innovation refers to strategies needing technological or marketing competences that are new for the firm (Benner and Tushman 2003, Danneels 2002), whereas exploitation innovation covers strategies based on accelerating innovation processes that use existing technological and marketing competences. Exploration usually generates radical (or discontinuous)-type innovation while exploitation tends to produce more incremental innovation (O'Reilly and Tushman 2004, Tushman and Anderson 1986). Mix both approaches implies to define innovation in terms of objectives (He and Wong 2004) as well as in terms of the necessary means (Benner and Tushman 2003) and underlying needed competences needed.

2.2. Effects of organizational context on innovation ambidexterity

There is still no consensus as to how exploration and exploitation activities should be combined. Some researchers advocate combining organizational and managerial solutions, that is to say, structural ambidexterity (O'Reilly and Tushman 2004). This can be achieved by the structural separation of exploration and exploitation activities, which nevertheless must be integrated by senior management (Benner and Tushman 2003, O'Reilly and Tushman 2004). Consequently, ambidextrous organizations need managers who understand different kinds of businesses and their needs, and who are capable of being "rigorous cost cutters and free-thinking entrepreneurs while maintaining the objectivity required to make difficult trade-offs" (O'Reilly and Tushman 2004, p. 81). Gibson and Birkinshaw (2004) argue that ambidexterity might best be achieved through individuals – who are considered to know best how to divide their time between the two conflicting activities. Contextual ambidexterity is defined as the individual behavioral capacity to demonstrate both alignment and adaptability (Gibson and Birkinshaw 2004). This type of ambidexterity depends on the systems, incentives and processes that shape individual behaviors in an organization, and these features define the organizational context (Ghoshal and Bartlett 1994). Discipline, stretch, trust and support were identified as the primary dimensions of organizational context. These dimensions, in turn, influence the levels of individual initiative, mutual cooperation and collective learning within companies. Shaping the organizational context is seen as being the central task of general managers (Ghoshal and Bartlett 1994). Created through tangible and concrete managerial actions, the organizational context thus emphasizes the role of managers in strategic processes – a theme that has led to much debate between researchers who view management as primordial and those who assign it a lesser role (Burgelman 1983).

In line with research on organizational context (Ghoshal and Bartlett 1994, Gibson and Birkinshaw 2004), we focused on general managers (Barnard 1938, Ghoshal and Bartlett 1994) and on the processes, systems and incentives they implement in order to operate ambidextrously. General managers are required to achieve a pragmatic balance between fundamentally different requirements at various corporate levels, such as operational performance at lower and middle levels, and the provision of strategic guidance at the corporate level (Burgelman 1983). Rather than the individual employees, it is managers who are mostly responsible for deciding how an employee's time should be spent and what he/she should be working on. And, as competition and complexity intensify, managers no longer face a simple choice between favoring routine processes that ensure efficiency and exploitation, or introducing non-routine processes and innovative exploration tasks; they are required to implement management practices and the adequate context that allow the simultaneous pursuit of both objectives (Volberda 1996). Flexibility requires task autonomy, variety and creativity, whereas efficiency requires formal rules and hierarchical controls, high levels of standardization, formalization and specialization (Adler et al. 1999). Mechanisms for managing the conflict between efficiency and flexibility (metaroutines, partitioning, switching and structural ambidexterity) are dependent for their success on the broader organizational context (Adler et al. 1999).

Organizational context should simultaneously favor short-term efficiency and long-term discovery, and organizational leaders must overcome potential problems caused by contradictory organizational alignments (Ghoshal and Bartlett 1994, Smith and Tushman 2005, Tushman and O'Reilly 1997). When trying to resolve the exploration/exploitation dilemma, management has the difficult task of implementing the most appropriate short- and long-term context.

HYPOTHESIS 1: The higher the level of (a) short-term oriented organizational context and of (b) long-term oriented organizational context, the higher the level of innovation ambidexterity (multiplicative interaction between exploration and exploitation innovation activities)

2.3. The moderating role of competence management

The symbiotic relationship between competence (or capabilities[1]) and innovation through new product development or technology management has been extensively studied (e.g., Leonard-Barton 1992, Tushman and Anderson 1986, Van de Ven 1986). More recently, the link between innovation and competence has been underlined as it relates to the firm's ability to implement change (Teece 2003) and to the non-imitable configuration and reconfiguration of competences. The introduction of such processes of knowledge and competence creation, absorption, integration and reconfiguration (Verona and Ravasi 2003) is largely the responsibility of managers. Previous research on the key role of strategic leadership has been mostly conceptual and has not investigated the way leaders create and manage competences (Adner and Helfat 2003, Teece et al. 1997). In the innovation management field, the case of Oticon, a Danish hearing-aid company (Verona and Ravasi 2003), illustrates the need for firms involved in knowledge creation and integration to be able to continuously innovate. However, the underlying processes and management that lead to the creation of adequate organizational contexts and allow competence creation/development have not been determined.

Following in the footsteps of Gatignon et al. (2002), we assessed the specific effects of competence management, which is composed of competence enhancement and new competence acquisition. The "orchestration" (Teece 2003) of competences requires astute and consistent management to succeed. Consequently, competence management is based on the ability of leaders to manage completely different and inconsistent organizational requirements (Tushman and O'Reilly 2007). Hence, we maintain that competence management moderates the relationship between organizational context and innovation ambidexterity: The type of organizational context influences the combination of exploitation and exploration innovations through the development of adequate, diversified, and somewhat contradictory, competences. The logic is that competence management and organizational context amplify themselves when they reinforce the same aspect of either exploitation or exploration activities (i.e. short-term organizational context coupled with exploitation competences and vice-versa).

HYPOTHESIS 2: The positive effect of short-term (long-term) context on innovation ambidexterity is stronger when exploitation (exploration) competence management is high than when it is low

HYPOTHESIS 3: The positive effect of short-term (long-term) context on innovation ambidexterity is weaker when exploration (exploitation) competence management is high than when it is low

3. Data and Methods

3.1. Survey and Data Collection

Questionnaires were sent to general managers of large firms (more than 250 employees, as defined by the OECD). 158 responses, which corresponds to a response rate of 9.3%, were received. To ensure all the firms considered were engaged in innovation activities, we filtered out non-innovative firms: 119 firms were found to be innovative. After removing responses with missing data, we obtained a final, valid sample of 108 firms.

3.2. Measures and validation

All the items on the questionnaire required seven-point Likert-style responses (from 1= "Strongly agree" to 7 = "Strongly disagree").

(a) Dependent Variable. Innovation ambidexterity has two main dimensions. In line with previous research (Bierly and Daly 2001, He and Wong 2004, Katila and Ahuja 2002), our premise was that exploration and exploitation are orthogonal and constitute two distinct dimensions of learning behaviors. We adapted our two scales from He and Wong (2004). The literature describes several ways of defining and measuring innovation ambidexterity (He and Wong 2004). We used the two most common: the "median cut-off" criterion was used to test the ambidexterity hypothesis (i.e., the link between high exploitation and exploration innovations), and the interaction effect (the ambidexterity score calculated as the product of the exploitation and exploration

[1] No consensus exists on the difference between capabilities and competences. In the present article, these notions are considered equivalent. Competences refer to the deployment of combined resources (Grant 1996).

innovation scores) was used to search for antecedents of the level of innovation ambidexterity reached by firms (as well as to run simple slope tests in order to analyze the moderating effects of competence management).
(b) Moderating variables. Exploitation and exploration competence management constructs were based on previous research (Atuahene-Gima 2005).
(c) Independent Variables. Structural relations between dimensions were highlighted by using a second order factorization (Hair et al. 1998) after checking (a) for the theoretical relevance of the construct (Chin 1998), and (b) that the confirmatory second order factorization model fit better than the confirmatory factor independent model. Short-term organizational context is composed of formalization and performance-oriented management. We conducted a second order factorization to construct a single latent variable for short-term context. Long-term organizational context involves two distinct variables: creativity and risk-taking. The second order factorization confirmatory model gave a better fit than the independent model.
(d) Control Variables. As described in section 4 below, we controlled for the type of industry. Because of the large number of Information Technology firms in our sample, we selected four activity sectors: IT, manufacturing industry, services and others.

4. Analysis and results: Determinants of ambidexterity scores

Using classical OLS regressions, we estimated two models to search for explanatory factors[2]. Model (a) estimated the effects of activity sector, organizational context and competences on ambidexterity scores. Model (b) tested the crossed effects of context and competences. Table 1 provides a summary of the regression results. It shows that combining the crossed effects of context and competence management increased R^2 by 20 points. The results of a Fisher test for restrictions ($F = 7.38$; $p < 0.01$) led us to prefer model (b). The covariates affected the ambidexterity scores in a number of ways[3]. For the control variables, model (b) shows there is no significant effect of sector of activity on innovation ambidexterity.

The most significant result of model (b) is that performance-oriented context positively affected ambidexterity scores. This result supports H1. The estimated coefficients showed that long-term oriented context (risk taking and creativity) are much more effective at producing ambidexterity than short-term ones (performance-oriented management and formalization). Both exploitation competence and short-term context positively affected innovation ambidexterity, but exploration competence management had a greater impact on ambidexterity scores than exploitation competence management. The interactions between context and competence management also had significant effects on ambidexterity. The results show that some combinations (such as long-term oriented context plus exploration competence management and short-term oriented context plus exploitation competence management) are effective. This gives evidenced to H2. Other combinations had negative impacts on ambidexterity, as was predicted by H3.

[2] Descriptive statistics are available upon request.
[3] Note that model (b) and the results given in Table 2 (based on different measures of innovation ambidexterity) provide the same evidence for explanatory factors of innovation ambidexterity.

Table 1 : Determinants of ambidextrous firms

	Model (a)		Model (b)	
	Coef.	Student t	Coef.	Student t
Constant	1.31	*1.03*	0.84	*1.36*
Industry sector	0.26	*1.39*	0.09	*1.09*
Other sector				
Services sector	Ref.		Ref.	
mgt_st: Short term organizational context	**0.12**	***2.09****	**0.17**	***1.96****
mgt_lt: Long term organizational context	**2.98**	***2.96******	**2.91**	***2.52******
comp_exploit: Competence exploitation incentives	**0.13**	***1.91****	**0.18**	***1.97****
comp_explor: Competence exploration incentives	**1.26**	***2.13****	**1.06**	***2.41****
mgt_lt x comp_exploit			**-0.53**	***2.31****
mgt_st x comp_exploit			**0.89**	***2.08****
mgt_lt x comp_explor			**1.02**	***3.66******
mgt_st x comp_explor			**-0.77**	***2.08****
R^2	0.35		0.55	
Fischer test	4.68		8.48	
Observations	108		108	

Note: Figures in italics are White robust standard errors with : *:significant at 10%; **: at 5%; ***: at 1%.

5. Discussion and conclusion

In this paper, we investigated the determinants of innovation ambidexterity, a facet that has not previously been studied, as, to date, research has concentrated on the link between innovation ambidexterity and performance (He and Wong 2004) or on the determinants of contextual ambidexterity (Gibson and Birkinshaw 2004). By providing evidence of the strong impact of organizational context on ambidexterity, our findings emphasize the key role of managers. Firms should ensure managers develop an appropriate context: Developing a supportive context for both short and long-term performance has a positive effect and increases ambidexterity scores for large firms; however, the most effective way of enhancing ambidexterity is to give long-term oriented context, such as creativity and risk taking, higher priority than short-term context (formalization and performance-oriented management). This result is consistent with the findings of Adler et al. (1999) in that effective management appears to be a precondition for consistent organizational and long-term performance. Such investment should focus on enhancing flexibility and innovation to avoid short-term pressures.

Our findings also support the view which gives leaders a dominant role in the development of a firm's competences. The incentives given by managers to develop either exploration or exploitation competences moderate the link between context and innovation ambidexterity. The moderating effect is greater when management is able to match the "right" competences with appropriate context (i.e. exploration competence with long-term performance-oriented context, and exploitation competence with short-term oriented context). The search for new competences (technological and marketing, as well as managerial and organizational) strengthens the positive effect of long-term oriented context. Our results therefore demonstrate the need to adopt a managerial approach to innovation. Research into how managers can continually develop and reconfigure the exploration competences needed to strengthen the positive effects on innovation ambidexterity of long-term oriented context is still in its infancy. Further analysis of ambidexterity in the context of innovation, a concept that is still in its infancy, and of organizational context and associated competences may be particularly fruitful for researchers and practitioners. The link between organizational learning, competences and innovation should also be reinforced with further research.

References

Adler, P.S., B. Goldoftas, D.I. Levine. 1999. Flexibility versus efficiency? A case study of model changeovers in the Toyota production system. *Organ. Sci*. **10**(1) 43-68.

Adner, R., C.E. Helfat. 2003. Corporate effects and dynamic managerial capabilities, *Strategic Management J.* **24**(10) 1011-1025.

Atuahene-Gima, K. 2005. Resolving the capacity-rigidity paradox in new product innovation. *J. of Marketing* **69**(Oct) 61-83.

Barnard, C. 1938. *The Functions of the Executive*. Harvard University Press, Harvard.

Benner, M.J., M.L. Tushman. 2003. Exploitation, exploration, and process management: The productivity dilemma revisited. *Academy of Management Rev.* **28**(2) 238-256.

Bierly, P., P. S. Daly. 2001. Exploration and exploitation in small manufacturing firms. *61th Annual Meeting Acad. Management*, Washington, D.C. (August 3–8).

Burgelman, R.A. 1983. A model of the interaction of strategic behavior, corporate context, and the concept of strategy. *Acad. of Management Rev*. **8**(1) 61-71.

Chin, W.W. 1998. Issues and Opinion on Structural Equation Modeling. *MIS Quarterly* **22**(1) 7-17.

Danneels, E. 2002. The dynamics of product innovation and firm competences. *Strategic Management J.* **23**(12) 1095-1121.

Gatignon, H., M.L. Tushman, W. Smith, P. Anderson. 2002. A structural approach to assessing innovation: Construct development of innovation locus, type, and characteristics. *Management Sci*. **48**(9) 1103-1122.

Gibson, C.B., J. Birkinshaw. 2004. The antecedents, consequences and mediating role of organizational ambidexterity. *Acad. Management J.* **47**(2) 209-226.

Gilsing, V., B. Nooteboom. 2006. Exploration and exploitation in innovation systems: The case of pharmaceutical biotechnology. *Res. Policy*. **35**(1) 1-23.

Ghoshal, S., C.A. Bartlett. 1994. Linking organizational context and managerial action: The dimensions of quality of management. *Strategic Management J.* **15**(5) 91-112.

Gupta, A.K., K.G. Smith, C.E. Shalley. 2006. The interplay between exploration and exploitation. *Acad. of Management J.* **49**(4) 693-706.

Grant, R.M. 1996. Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. *Organ. Sci*. **7**(4) 375-388.

Hair, J.F., R.E. Anderson, R.L. Tatham, W.C. Black. 1998. *Multivariate Data Analysis with Readings*. Upper Saddle River, NJ, Prentice-Hall.

He, Z.-L., P.-K. Wong. 2004. Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. *Organ. Sci*. **15**(4) 481–494.

Jansen, J.J.P., F.A.J Van den Bosch, H.W Volberda. 2005. Exploratory innovation, exploitative innovation, and ambidexterity: The impact of environmental and organizational antecedents. *Schmalenbach Bus. Rev*. **57**(4) 351-363.

Leonard-Barton, D. 1992. Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management J.* **13**(5) 111-125.

Levinthal, D.A., J.G. March. 1993. The myopia of learning. *Strategic Management J.* **14**(8) 95-112.

March, J.G. 1991. Exploration and exploitation in organizational learning. *Organ. Sci*. **2**(1) 71-87.

O'Reilly C.A., M.L. Tushman. 2004. The ambidextrous organization. *Harward Bus. Rev*. **82**(4) 74-81.

Porter, M.E. 1991. Towards a dynamic theory of strategy. *Strategic Management* J. **12**(8) 95-117.

Rumelt, R.P., D. Schendel, D.J. Teece. 1991. Strategic management and economics. *Strategic Management J.* **12**(8) 5-29.

Smith, W.K., M.L. Tushman. 2005. Managing strategic contradictions: A top management model for managing innovations streams. *Organ. Sci.* **16**(5) 522-536.

Teece, D.J. 1986. Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Res. Policy* **15** 285-305.

Teece, D.J. 2003. Explicating dynamic capabilities: Asset selection, coordination, and entrepreneurship in strategic management theory. Working Paper, Haas School of Business, University of California, Berkeley.

Teece, D.J., G. Pisano. 1994. The dynamic capability of firms: an introduction. *Indust. and Corporate Change* **3**(3) 1089-1103.

Teece, D.J., G. Pisano, A. Shuen. 1997. Dynamic capabilities and strategic management. *Strategic Management J.* **18**(7) 509-533.
Tushman, M.L., P. Anderson. 1986. Technological discontinuities and organizational environments. *Admin. Sci. Quart.* **31**(4) 439–465.
Tushman, M.L., C. O'Reilly. 1996. Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Rev*. **38**(4) 8-30.
Tushman, M.L., C.A. O'Reilly. 1997. *Winning Through Innovation*. Harvard Business School Press, Boston, MA.
Van de Ven, A.H. 1986. Central problems in the management of innovation. *Management Sci*. **32**(5) 590-607.
Van den Bosch, F., H. Volberda, M. De Boer. 1999. Coevolution of firm absorptive capacity and knowledge environment: Organizational forms and combinative capabilities. *Organ. Sci*. **10**(5) 551-568.
Verona, G., D. Ravasi. 2003. Unbundling dynamic capabilities: an exploratory study of continuous product innovation. *Indus. and Corporate Change* **12** (3) 577-606.
Volberda, H.W. 1996. Toward the flexible form: How to remain vital in hypercompetitive environments. *Organ. Sci. 7(4) 359-374.*